SECTION 16482 - MOTOR-CONTROL CENTERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes motor-control centers for use on ac circuits rated 600 V and less.

B. Related Sections include the following:

1. Division 16 Section "Electrical Identification" for labeling materials.

1.3 SUBMITTALS

A. Product Data: For products specified in this Section. Include dimensions, ratings, and data on features and components.

B. Shop Drawings: For each motor-control center specified in this Section. Include dimensioned plans, elevations, and component lists. Show ratings, including short-time and short-circuit ratings, and horizontal and vertical bus ampacities.

1. Schedule of features, characteristics, ratings, and factory settings of individual motor-control center units.
2. Wiring Diagrams: Interconnecting wiring diagrams pertinent to class and type specified for motor-control center. Schematic diagram of each type of controller unit indicated.

C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

D. Maintenance Data: For products to include in the maintenance manuals specified in Division 1.

E. Load-Current and Overload-Relay Heater List: Compile after motors have been installed and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.

F. Qualification Data for Field Testing Agency: Certificates, signed by Contractor, certifying that agency complies with requirements specified in "Quality Assurance" Article below.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain similar motor-control devices through one source from a single manufacturer.

B. Comply with NFPA 70.

C. Listing and Labeling: Provide motor-control centers and components specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

D. Product Selection for Restricted Space: Drawings indicate maximum dimensions for motor-control centers, including clearances between motor-control centers and adjacent surfaces and items, and are based on types and models indicated. Other manufacturers' motor-control centers with equal performance characteristics and complying with indicated maximum dimensions may be considered. Refer to Division 1 Section "Substitutions."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store so condensation will not occur on or in motor-control centers. Provide temporary heaters as required to prevent condensation.

B. Handle motor-control centers according to NEMA ICS 2.3, "Instructions for the Handling, Installation, Operation, and Maintenance of Motor Control Centers." Use factory-installed lifting provisions.

1.6 COORDINATION

A. Coordinate features of controllers and accessory devices with pilot devices and control circuits to which they connect.

B. Coordinate features, accessories, and functions of each motor controller with the ratings and characteristics of the supply circuit, the motor, the required control sequence, and the duty cycle of the motor and load.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Allen-Bradley Co.; Industrial Control Group.
2. Eaton Corp.; Westinghouse & Cutler-Hammer Products.
3. Furnas Electric Co.
4. General Electric Co.; Electrical Distribution & Control Div.
5. Siemens Energy & Automation, Inc.
6. Square D Co.

2.2 MOTOR-CONTROL CENTERS

A. Wiring: NEMA ICS 3, Class II, Type B.

B. Enclosures: Surface-mounted cabinets as indicated. NEMA 250, Type 1, unless otherwise indicated to meet environmental conditions at installed location.

1. Compartments: Modular; individual doors have concealed hinges and quick-captive screw fasteners. Interlocks on combination controller units require disconnect means in off position before door can be opened or closed, except by consciously operating a permissive release device.
2. Interchangeability: Compartments are constructed to remove units without opening adjacent doors, disconnecting adjacent compartments, or disturbing the operation of other units in control center. Units requiring the same size compartment are interchangeable, and compartments are constructed to permit ready rearrangement of units, such as replacing 3 single units with a unit requiring 3 spaces, without cutting or welding.
3. Wiring Spaces: Each vertical section of structure with horizontal and vertical wiring has spaces for wiring to each unit compartment in each section, with supports holding wiring in place.

C. Short-Circuit Current Rating for Each Section: Equal to or greater than available fault current in symmetrical amperes at motor-control center location, or as listed on schedules.

2.3 BUSES

A. Material: Plated copper.

B. Ampacity Ratings: 300A vertical bus and 600A main bus.

C. Neutral Buses: 300A.

D. Equipment Ground Bus: Noninsulated, horizontal copper bus 50 by 6 mm, minimum.

E. Horizontal Bus Arrangement: Main phase, neutral and ground buses extended with same capacity the entire length of motor-control center, with provision for future extension at both ends by bolt holes and captive bus splice sections or approved equivalent.

F. Short-Circuit Withstand Rating: 42,000A/C minimum.

2.4 FUNCTIONAL FEATURES

A. Description: Modular arrangement of motor controllers, control devices, overcurrent protective devices, blank panels, and other items mounted in compartments of motor-control center as indicated.

B. Motor-Controller Units: Combination controller units of types and with features, ratings, and circuit assignments indicated.

1. Units with full-voltage, across-the-line, magnetic controllers up to and including Size 3 are installed on drawout mountings with connectors that automatically line up and connect with vertical-section buses while being racked into their normal, energized positions.
2. Units have short-circuit current ratings equal to or greater than short-circuit current rating of motor-control center section.
3. Units in motor-control centers with Type B and C wiring are equipped with pull-apart terminal strips or drawout terminal boards for external control connections.

C. Overcurrent Protective Devices: Types of devices with features, ratings, and circuit assignments indicated. Individual feeder-tap units through 225-A rating shall be installed on drawout mountings with connectors that automatically line up and connect with vertical-section buses while being racked into their normal, energized positions.

D. Spaces and Blank Units: Compartments fully bused and equipped with guide rails or equivalent, ready for insertion of drawout units.

E. Spare Units: Type, sizes, and ratings as indicated, and installed in compartments indicated "spare."

2.5 MAGNETIC MOTOR CONTROLLERS

A. Description: NEMA ICS 2, Class A, full voltage, nonreversing, across the line, unless otherwise indicated.

B. Control Circuit: 120 V; obtained from integral control power transformer, unless otherwise indicated. Include a control power transformer with adequate capacity to operate connected pilot, indicating and control devices, plus 100 percent spare capacity.

C. Combination Controller: Factory-assembled combination controller and disconnect switch with overcurrent protection as indicated.

1. Fused Disconnect: Motor-circuit protection sized 125 percent FLA.

D. Overload Relay: Ambient-compensated type with inverse-time-current characteristic. Provide with heaters or sensors in each phase matched to nameplate full-load current of specific motor to which they connect, and with appropriate adjustment for duty cycle.

2.6 ACCESSORIES

A. Devices are factory installed in controller enclosure, unless otherwise indicated.

B. Push-Button Stations, Pilot Lights, and Selector Switches: NEMA ICS 2, heavy-duty type.

C. Stop and Lockout Push-Button Station: Momentary-break push-button station with a factory-applied hasp arranged so a padlock can be used to lock push button in depressed position with control circuit open.

D. Impulse sparkover voltage coordinated with system circuit voltage.

E. Factory mounted with a Nationally Recognized Testing Laboratory listed and labeled mounting device.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Select features of each motor controller to coordinate with ratings and characteristics of supply circuit and motor; required control sequence; duty cycle of motor, drive, and load; and configuration of pilot device and control circuit affecting controller functions.

B. Select horsepower rating of controllers to suit motor controlled.

C. Push-Button Stations: In covers of magnetic controllers for manually started motors where indicated, start contact connected in parallel with sealing auxiliary contact for low-voltage protection.

D. Hand-Off-Automatic Selector Switches: In covers of manual and magnetic controllers of motors started and stopped by automatic controls or interlocks with other equipment.

3.2 INSTALLATION

A. Install motor-control centers according to NEMA ICS 2.3 and manufacturer's written instructions.

B. Anchor each motor-control center assembly to steel-channel sills arranged and sized according to manufacturer's written instructions. Attach by tack welding or bolting. Level and grout sills flush with motor-control center mounting surface.

C. Install motor-control centers on concrete housekeeping bases conforming to Division 3 Section "Cast-in-Place Concrete."

3.3 IDENTIFICATION

A. Identify field-installed wiring and components and provide warning signs according to Division 16 Section "Electrical Identification."

B. Operating Instructions: Frame printed operating instructions for motor-control centers, including control sequences, and emergency procedures. Fabricate frame of finished wood or metal and cover instructions with clear acrylic plastic. Mount on front of motor-control centers.

3.4 CONTROL WIRING INSTALLATION

A. Install wiring between motor-control devices according to Division 16 Section "Wires and Cables."

B. Bundle, train, and support wiring in enclosures.

C. Connect hand-off-automatic switch and other automatic control devices according to an indicated wiring diagram or one that is manufacturer approved, where available.

1. Connect selector switches to bypass only the manual and automatic control devices that have no safety functions when switch is in the hand position.
2. Connect selector switches with motor-control circuit in both hand and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor-overload protectors.

3.5 CONNECTIONS

A. Tighten motor-control center bus joint, Electrical connector, and terminal bolts according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A.

3.6 FIELD QUALITY CONTROL

A. Testing: After installing motor-control center and after Electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and Electrical test stated in NETA ATS, Sections 7.5, 7.6, and 7.16. Certify compliance with test parameters.
2. Remove and replace malfunctioning units with new units, and retest.

3.7 CLEANING

A. Inspect interior and exterior of motor-control centers. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish. Clean devices internally, using methods and materials recommended by manufacturer.

3.8 DEMONSTRATION

A. Conduct a minimum of 4 hours of training in operation and maintenance as specified in Division 1 Section "Contract Closeout." Include training relating to equipment operation and maintenance procedures.

B. Schedule training with at least 7 days' advance notice.

END OF SECTION 16482